64. (New) The method of claim 62 wherein said selecting step is performed automatically based on the degree of registration of each atlas in said database with said emission tomography images.

65. (New) The method of claim 64 wherein the degree of registration is determined by:

performing a preliminary reconstruction of each atlas; and

registering the atlas to the preliminary reconstruction.

66. (New) The method of claim 64 further comprising the step of combining multiple atlases to yield a resultant atlas that better registers with said emission tomography images.

67. (New) The method of claim 62 wherein said database includes disease specific atlases, physical trait specific atlases and/or tracer or lesion specific atlases.

REMARKS

Claims 1, 3, 14, 16, 18, 20, 27 and 28 have been amended to define clearly the Applicants' invention. New claims 30 to 67 have been added to define further aspects of the Applicants' invention. Claims 1 to 67 are now pending in the present application and are believed to distinguish patentably over the prior art.

In the Official Action, the Examiner has raised objections to the application noting a missing page number on page 1, a missing reference to the related U.S. provisional patent application on page 1 and a missing abstract. The application has been amended to deal with the Examiner's objections.

With respect to prior art, the Examiner has rejected claims 1, 14, 18, 27 and 28 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,376,796 to Chan et al. ("Chan") in view of U.S. Patent No. 5,376,795 to Hasegawa et al. ("Hasegawa"). The Examiner is alleging that the Applicants' invention as defined by these claims would be obvious to one of ordinary skill in the art in view of the combined teachings of these references. Applicants thank the Examiner for indicating allowable subject matter in claims 2

to 13, 15 to 17, 19 to 26 and 29. Applicants however respectfully submit that claims 1 to 67 now pending in the present application distinguish patentably over the cited references for the reasons set forth below.

According to one aspect of the Applicants' invention as defined by independent claim 1, Applicants provide a method of applying scatter and attenuation correction to emission tomography images of a region of interest of a subject under observation. A three-dimensional computer model representing the density distribution within the region of interest is aligned with the emission tomography images. The computer model is created from image data of other subjects thereby to avoid the need to image the subject under observation to create the computer model. Scatter and attenuation correction is then applied to the emission tomography images using the aligned computer model as a guide.

In contrast, Chan discloses a direct measurement system for proximity detection of a body profile for use within nuclear medicine. The measurement system includes two or three proximity detectors mounted on a gantry structure of a nuclear medicine camera that emit an energy beam which is swept across a portion of a target body. Each detector is capable of directly measuring the distance from the proximity detector unit to the target body with a beam sample. The detectors then create a body profile of the target body which is used to minimize the distance between the collimator of an ECT scanning camera and the target body surface. Thereafter, the ECT camera is used to obtain images of the subject. The body contour data is used to correct attenuation in the images captured by the ECT camera. As will be appreciated, Chan requires the subject to be imaged twice, firstly to generate the body contour data and secondly to capture ECT images. If the patient moves after the body contour data has been captured but prior to capturing the ECT images, the body contour data will be misaligned with the ECT images and therefore inaccurate image correction will result.

Hasegawa discloses a system for acquiring correlated transmission and emission images with a dedicated imaging instrument and includes algorithms to process the emission and transmission data to calculate radionuclide concentrations in anatomical regions being imaged. A radiation detector records radionuclide images. A transmission source and

detector acquires transmission images from which the anatomy of the body can be determined. The relative spatial locations between the emission and transmission data sets are maintained by placing a localized apparatus on the patient which is scanned concurrently with the patient. The emission detector and transmission detector are electronically connected to data acquisition electronics which receive the detector signals and generate signals representative of the radiation striking the detectors. A computer uses tomographic reconstruction algorithms to calculate an attenuation map which shows the distribution of attenuation coefficients at each point across the volume imaged in the patient. Because the emission and transmission data are registered spatially, the attenuation map can be used as input data which is used in the reconstruction of the radionuclide images.

As will be appreciated, Hasegawa discloses a method where both emission and transmission images of the patient under observation are acquired with the transmission images be used to generate an attenuation map. Applicants respectfully submit that Chan and Hawegawa fail to teach or suggest the use of a three-dimensional model representing the density distribution within the region of interest of the subject under observation that is created from image data of other subjects thereby to avoid the need to image the subject under observation to create the computer model. Accordingly, Applicants respectfully submit that independent claim distinguishes patentably over the cited prior art and should be allowed. Since claims 2 to 13 and 30 to 34 are dependent either directly or indirectly on independent claim 1, which is deemed allowable, Applicants respectfully submit that these claims should also be allowed.

Independent claims 14, 18, 27 and 28 have been amended in a similar manner to independent claim 1 and recite that the computer model is created from image data of other subjects thereby to avoid the need to image the subject under observation to create the computer model. Accordingly, Applicants respectfully submit that these claims distinguish patentably over the cited prior art for the reasons set forth above and should be allowed. Since claims 15 to 17 and 35 to 39 are dependent either directly or indirectly on independent claim 14, which is deemed allowable, since claims 19 to 26 are dependent either directly or indirectly on independent claim 18, which is deemed allowable and since claim 29 is

dependent directly on independent claim 28, which is deemed allowable, Applicants respectfully submit that these claims should also be allowed.

New independent claim 40 has been added and includes the subject matter of original claims 1 and 2. Since the Examiner has indicated that claim 2 would be allowable if rewritten in independent form to include the subject matter of the base claim, Applicants respectfully submit that this claim should be allowed. Since claims 41 to 45 are dependent either directly or indirectly on independent claim 40, which is deemed allowable, Applicants respectfully submit that these claims should also be allowed.

New independent claim 46 has been added and includes the subject matter of original claims 14 and 15. Since the Examiner has indicated that claim 15 would be allowable if rewritten to incorporate the subject matter of the base claim, Applicants respectfully submit that this claim should be allowed. Since claims 47 and 48 are dependent either directly or indirectly on independent claim 46, which is deemed allowable, Applicants respectfully submit that these claims should also be allowed.

New independent claim 49 has been added and includes the subject matter of original claims 18 and 19. Since the Examiner has indicated that claim 19 would be allowable if rewritten to incorporate the subject matter of the base claim, Applicants respectfully submit that this claim should be allowed. Since claims 52 to 54 are dependent either directly or indirectly on new independent claim 49, which is deemed allowable, Applicants respectfully submit that this claim should also be allowed.

New independent claim 55 has been added and defines an emission tomography imaging method wherein emission tomography images of a region of interest of a subject under observation are acquired. A three-dimensional computer model representing the density distribution within the region of interest is aligned with the emission tomography images without requiring the subject to be imaged to create the computer model. Scatter and attenuation correction is applied to the emission tomography images using the aligned computer model as a guide.

Applicants respectfully submit that this method distinguishes patentably over the cited prior art for the reasons set forth above. The methods disclosed in the cited references require the subject to be imaged to acquire both the transmission images and the

data used to correct attenuation. Accordingly, Applicants respectfully submit that this claim should be allowed. Since claims 56 to 67 are dependent either directly or indirectly on independent claim 55, which is deemed allowable, Applicants respectfully submit that these claims should be allowed.

In view of the above, it is believed the application is now in order for allowance and action to that end is respectfully requested.

Respectfully submitted,

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JOHN F. HOFFMAN, REG. NO. 26,280
Name of Registered Representative

Signature

February 13, 2003
Date

APPENDIX SHOWING DISCLOSURE AMENDMENTS

Please amend the disclosure as follows:

On page 1, please add page number -1- to the top of the page.

On page 1, before the heading "Technical Field" please add the following heading and paragraph:

Cross-Reference to Related Application

The present application claims the benefit of U.S. Provisional Patent Application No. 60/096,649 filed on August 14, 1998.

APPENDIX SHOWING CLAIM AMENDMENTS

Please amend claims 1, 3, 14, 16, 18, 20, 27 and 28 as follows:

1. (Amended) A method of applying scatter and attenuation correction to emission tomography images of a region of interest of a subject under observation comprising the steps of:

aligning a three-dimensional computer model representing the density distribution within said region of interest with said emission tomography images, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

applying scatter and attenuation correction to said emission tomography images using said aligned computer model as a guide.

3. (Amended) The method of claim 2 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, [the] an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

14. (Amended) An emission tomography imaging method where emission tomography images of a region of interest of a subject are taken for analysis and are corrected for scatter and attenuation, the method further comprising the step of:

using a three-dimensional computer model approximating the density distribution within the region of interest as a guide to the application of scatter and attenuation correction, said computer model being created from image data of other subjects thereby to avoid the need to image said subject to create said computer model.

16. (Amended) The emission tomography imaging method of claim 15 wherein during said aligning step, a functional component of said atlas is firstly aligned with said emission tomography images to generate a set of spatial transformation parameters and thereafter, [the]

an anatomical component of said atlas is aligned with said emission tomography images using said set of spatial transformation parameters.

18. (Amended) An emission tomography image processing system comprising:

memory storing emission tomography images of a region of interest of a subject under observation;

said memory also storing at least one three-dimensional computer model of said region of interest, said computer model representing the density distribution within said region of interest, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

a processor for registering said computer model with said emission tomography images and for applying scatter and attenuation correction to said emission tomography images using said registered computer model as a guide.

20. (Amended) An emission tomography image processing system as defined in claim 19 wherein said processor firstly registers a functional component of said atlas with said emission tomography images to generate a set of spatial transformation parameters and then registers [the] an anatomical component of said atlas with said emission tomography images using said set of spatial transformation parameters.

27. (Amended) An emission tomography imaging system comprising:

means for taking emission tomography images of a region of interest of a subject under observation to form a three-dimensional image of said region of interest;

memory to store said emission tomography images, said memory also storing at least one three-dimensional computer model of said region of interest, said computer model representing the density distribution within said region of interest, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

a processor for aligning said computer model with said emission tomography images and for applying scatter and attenuation correction to said emission tomography images using said aligned computer model as a guide.

28. (Amended) A computer readable medium including computer program code for applying scatter and attenuation correction to emission tomography images of a region of interest of a subject under observation, said computer readable medium including:

computer program code for aligning a three-dimensional computer model representing the density distribution within said region of interest with said emission tomography images, said computer model being created from image data of other subjects thereby to avoid the need to image said subject under observation to create said computer model; and

computer program code for applying scatter and attenuation corrections to said emission tomography images using said aligned computer model as a guide.